

Docket No. SA-525

Exhibit No. #9C

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Systems Group Chairperson's
Systems Documentation Exhibit

(12 Pages)

Exhibit Section 1.0

**Canadair Regional Jet Quick Reference Handbook CSP-A022
Single Engine Procedures Page ABNORM 1-7
TR RJ/59-1, Sep 29/04**



ABNORM 1-7

TR RJ/59-1, Sep 29/04

Single Engine Procedures (Cont'd)

Windmilling Relight:

- (1) Relight envelope (See table below) REVIEW

Windmill Relight Envelope			
ALTITUDE	AIRSPEED	ITT	% N ₂
21,000 ft to 15,000 ft	300 KIAS to V _{MO} /M _{MO}	90°C or less	12 to 55
15,000 ft to 8,000 ft			9 to 55
8,000 ft to SL	300 KIAS to V _{MO} /M _{MO}		

NOTE

1. Windmill airstart efficiency is enhanced by attaining the highest practical airspeed and N₂ within the relight envelope.
2. If windmill speeds of 9% N₂ and 12% N₂, at below 15,000 feet and above 15,000 feet respectively, are not achieved, an approximate 1.5% to 2.5% increase in N₂ may be obtained by disconnecting the corresponding IDG using the IDG DISC. (Once a disconnect has been performed however, the IDG cannot be re-connected in flight).

- (2) Affected GEN OFF
 (3) Affected PACK OFF
 (4) FUEL, BOOST PUMPS BOTH ON

When ready to start:

- (5) CONT IGNITION ON
 (6) Airspeed INCREASE TO 300 KIAS or greater

NOTE

Maintain airspeed throughout light-off engine start is complete (stable idle). Monitor engine parameters carefully.

When relight envelope is established:


- (7) Affected thrust lever IDLE

NOTE

N₂ acceleration should be positive and uninterrupted. Stable idle speed must be reached within 2 minutes.

Exhibit Section 2.0

**Canadair Regional Jet Airplane Flight Manual, CSP A-012
Abnormal Procedures Pages 05-13-1 and -11
REV 57, Apr 05/04**

	ABNORMAL PROCEDURES Hydraulic Power	05-13-1
		REV 57, Apr 05/04

1. HYDRAULIC POWER

NOTE

If during the accomplishment of a hydraulic system low pressure procedure, a second system also fails, disregard both single system failures and proceed directly to the applicable double system failure procedure.

A. HYD 1 LO PRESS

TO PREVENT FLIGHT CONTROL UNDAMPED VIBRATION DURING A HYDRAULIC SYSTEM FAILURE:	
ALTITUDE LIMITATION	AIRSPPEED LIMITATION
31,000 feet	0.55 Mach (199 KIAS)
30,000 feet	0.55 Mach (204 KIAS)
28,000 feet	0.55 Mach (213 KIAS)
26,000 feet	0.55 Mach (222 KIAS)
24,000 feet	0.55 Mach (232 KIAS)
22,000 feet	0.55 Mach (241 KIAS)
20,000 feet and below	252 KIAS

(1) HYDRAULIC 1 pump switch ON

(2) Hydraulic pressure and fluid quantity Monitor

If System 1 quantity readout is less than 5%, or if pressure is less than 1800 psi, or if pressure is rapidly decreasing:

(3) HYDRAULIC 1 pump switch OFF

(4) HYDRAULIC page and FLIGHT CONTROLS page Review affected systems

(5) Land at the nearest suitable airport.


(6) Actual landing distance Increase

WITHOUT THRUST REVERSERS	WITH ONE THRUST REVERSER
1.15 (15%)	1.13 (13%)

NOTE

Maximize the use of reverse thrust.

DOT Approved	Airplane Flight Manual CSP A-012	
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	ABNORMAL PROCEDURES Hydraulic Power	05-13-11
		REV 57, Apr 05/04

M. HYD 1 LO PRESS and HYD 2 LO PRESS

TO PREVENT FLIGHT CONTROL UNDAMPED VIBRATION DURING HYDRAULIC SYSTEM FAILURES:	
ALTITUDE LIMITATION	AIRSPEED LIMITATION
Do not exceed 10,000 feet	Do not exceed 200 KIAS

- (1) HYDRAULIC pump switches (all) ON
- (2) Systems 1 and 2 pressures and fluid quantities Check

If Systems 1 and 2 pressures and fluid quantities are normal:

- (3) Systems 1 and 2 pressures and fluid quantities Monitor

If Systems 1 and 2 pressures and fluid quantities are not normal:

- (3) HYDRAULIC 1 and 2 pump switches OFF
- (4) HYDRAULIC page and FLIGHT CONTROLS page Review affected systems
- (5) Land at the nearest suitable airport.

Prior to landing:
Airplanes with the GPWS installed:

- (6) GPWS/FLAP OVRD switch OVRD

Airplanes with the EGPWS <0040> installed:

- (6) GRND PROX, FLAP switch OVRD

- (7) Landing flaps 20
- (8) Approach speed $V_{REF} \text{ (Flaps 45°)} + 12 \text{ KIAS minimum}$
- (9) Actual landing distance
(with hydraulic systems 1 & 2 failed) Increase

WITHOUT THRUST REVERSERS	WITH THRUST REVERSERS
2.40 (140%)	1.90 (90%)

NOTE

Apply brakes carefully and maximize the use of reverse thrust.



Anticipate the loss of outboard brakes during landing when System 2 brake accumulator depressurizes.

DOT Approved	Airplane Flight Manual CSP A-012	
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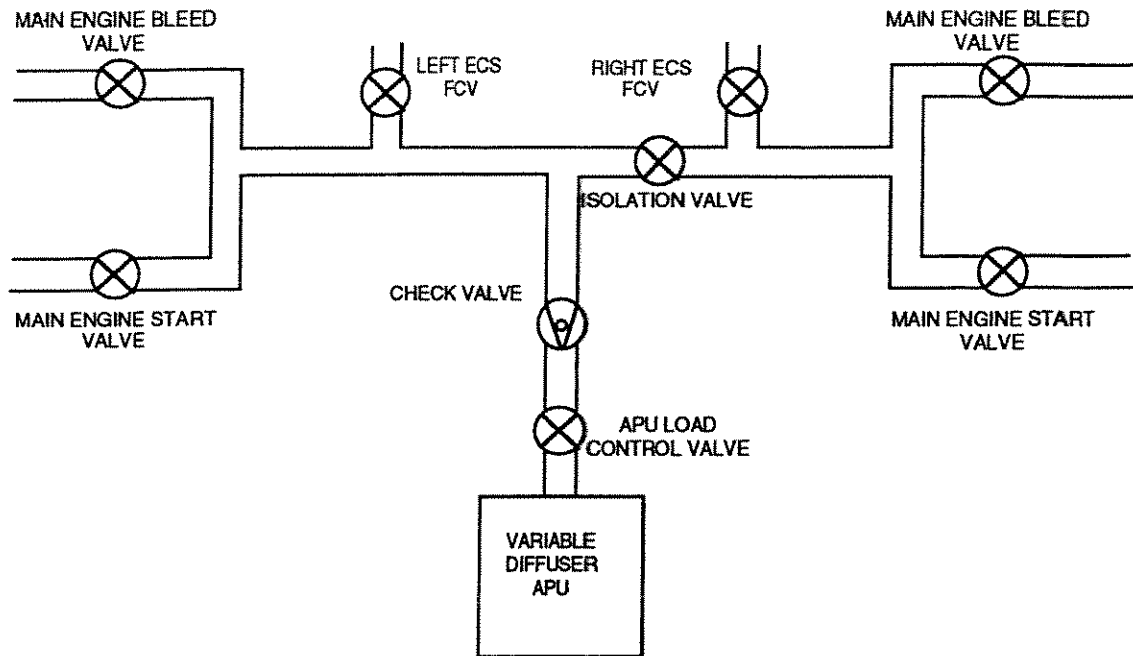
Exhibit Section 3.0

**Garrett Airline Services Division technical Training Presents
How To Maintain the GTCP36-150(RJ) Auxiliary Power Unit
ATM 708, January 1992, Pages Intro-1 and 1-14**

GARRETT AIRLINE SERVICES DIVISION
TECHNICAL TRAINING
PRESENTS

HOW TO MAINTAIN THE
GTCP36-150(RJ)
AUXILIARY POWER
UNIT

DESIGN FUNCTIONS



ATM708.07

DESIGN FUNCTIONS

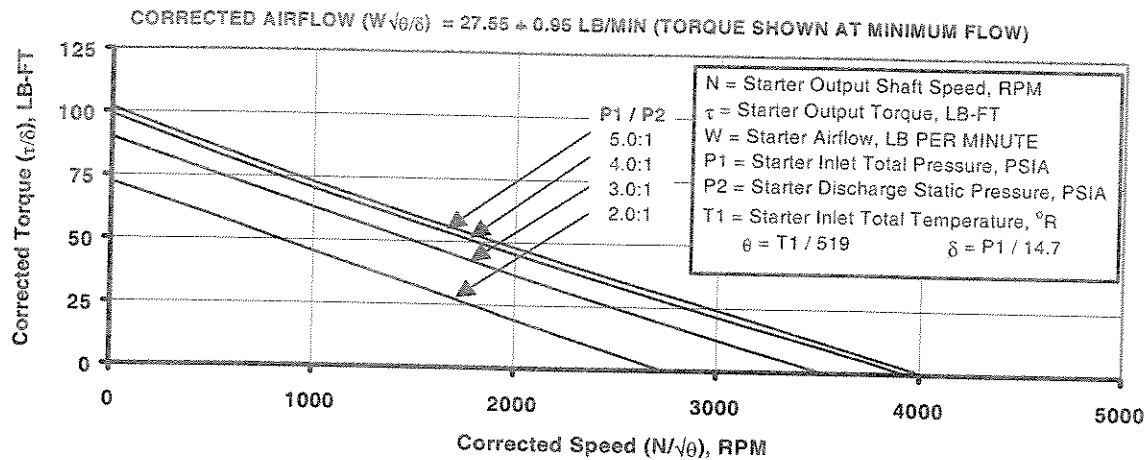
The GTCP36-150 (RJ) forms part of the aircraft electrical and pneumatic systems to perform the following functions:

1. Shaft horsepower to drive a 30 KVA generator to supply electrical power to the aircraft throughout its operating envelope when needed. In addition, it drives pumps and similar devices connected to the accessory section.
2. Pneumatic power, in the form of large quantities of heated and pressurized air, to operate the aircraft air conditioning systems, engine starters and other air driven equipment. On the ground, bleed air is supplied for air conditioning units (ACU's) and main engine starts (MES).

During flight conditions, the APU serves a source of standby bleed air for the ACU's throughout the operating envelope, or, it can supply bleed air for MES to an altitude of 13,000 feet and for MES-assists to an altitude of 21,000 feet during windmill starts.

Exhibit Section 4.0

**Honeywell Engine Systems & Accessories Estimated Generalized Performance,
Air Turbine Starter, ATS100-395H, Issued 8/04**

Estimated Generalized PerformanceLeading Particulars

Turbine	Type:	Axial
	Moment of Inertia:	0.146 slug-ft ² (referenced at output shaft)
Reduction Gearing	Type:	Compound planetary
	Ratio:	26.6:1
Engage-disengage Mechanism	Type:	Inner race overrunning sprag clutch
	Function:	Provides for positive engagement with the engine to maximum cutout speed; overruns during engine operation as the starter gear train and turbine stop rotation.
	Limitations:	May be re-engaged between 0-4000 rpm
Drive shaft (output shaft)	Description:	Replaceable shear section and decoupler; 1.2" P.D. spline mates with MS3327-9S
	Shear Limits:	900-1000 lb-ft
Safety	Description:	Blades/rim and tri-hub burst to maximum freerun speed. Axial containment in the event of thrust bearing failure.

Customer Operating Considerations

Lubrication system	Sump capacity:	350 cc
	Oil Type:	MIL-L-23699
Electrical System	Description:	28 Vdc normally closed cutout switch, opens at 3800-4000 rpm
Operating Environment	Temperature:	-65° F to 250° F
	Altitude:	Not limited

For further information:
Honeywell
P.O. Box 22200
Tempe, Arizona 85284-2200
(480) 592-2200

Honeywell

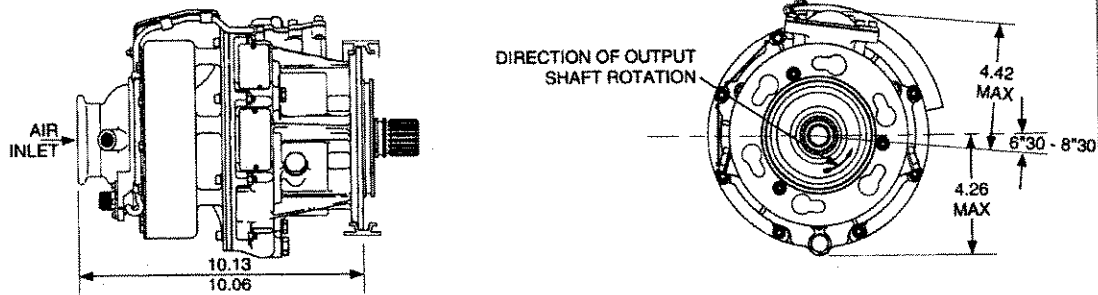
Honeywell Aerospace

Engine Systems & Accessories

AIR TURBINE STARTER

ATS100-395H

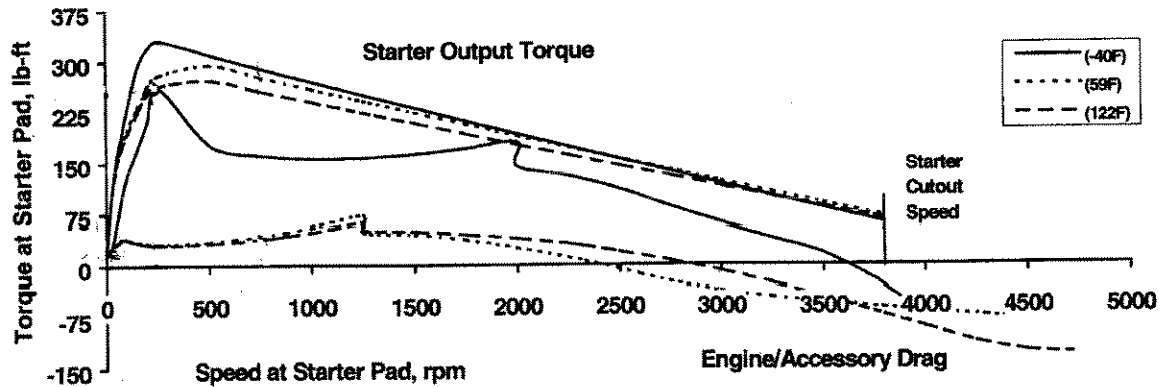
Installation / Interface



Outline Drawing:	3505188	ATS Pad/Hp Rotor:	0.399
Weight:	26.8 lb (dry)	Aircraft:	Canadair CL601RJ
Shaft Rotation:	CCW (viewed from starter pad)	Engine:	GE CF34-3A
Mounting Flange:	V-Band MS3327-9S	Bleed Source:	Model GTCP36-100E APU

Performance

Engine Starting Characteristics



Nozzle area (effective): 1.34 in²

Operating Condition	SL, -40°F	SL, 59°F	SL, 122°F
Inlet pressure, psia	52.2	50.0	47.0
Inlet temperature, °F	325.0	438.2	500.0
Airflow, lb/min	79.6	71.2	64.8
Time to cutout, sec	53.9	19.5	22.4
Time to idle, sec	57.6	27.0	29.6
Peak shaft horsepower	74.0	73.7	68.7